



# UNIVERSITÀ DI PAVIA

Anno Accademico 2021/2022

## PROCESS CONTROL

<b>Anno immatricolazione</b>	2020/2021
<b>Anno offerta</b>	2021/2022
<b>Normativa</b>	DM270
<b>SSD</b>	ING-INF/04 (AUTOMATICA)
<b>Dipartimento</b>	DIPARTIMENTO DI INGEGNERIA INDUSTRIALE E DELL'INFORMAZIONE
<b>Corso di studio</b>	INGEGNERIA ELETTRICA
<b>Curriculum</b>	Sistemi elettrici
<b>Anno di corso</b>	2°
<b>Periodo didattico</b>	Primo Semestre (27/09/2021 - 21/01/2022)
<b>Crediti</b>	6
<b>Ore</b>	45 ore di attività frontale
<b>Lingua insegnamento</b>	English
<b>Tipo esame</b>	SCRITTO
<b>Docente</b>	FERRARA ANTONELLA (titolare) - 6 CFU DI PALMA FEDERICO - 0 CFU
<b>Prerequisiti</b>	Knowledge acquired in previous courses in Automatic Control and Mathematical Methods in Engineering.
<b>Obiettivi formativi</b>	The course describes and analyzes control schemes which are frequently used at industrial level. It also provides the basics for the design of digital control systems.
<b>Programma e contenuti</b>	Industrial control schemes: Cascade control, open loop control, filtering of the reference signal, compensation of measurable disturbances, two degrees of freedom control schemes, Smith Predictor, decentralized control, relative gain array, decoupling schemes.  PID controllers

Features and properties. Rules for the empirical calibration. Wind-up and anti wind-up schemes.

Digital control:

Discrete-time systems. The concept of equilibrium for discrete-time systems. Stability. Stability of linear time-invariant discrete-time systems. Jury test. Digital control schemes. Sampling problem. Choice of the sampling time. Discretization of continuous-time controllers. Euler and Tustin methods.

#### Metodi didattici

Lectures (hours/year in lecture theatre): 45  
Practical class (hours/year in lecture theatre): 0  
Practicals / Workshops (hours/year in lecture theatre): 0

#### Testi di riferimento

Lecture notes

Paolo Bolzern, Riccardo Scattolini, Nicola Schiavoni. Fondamenti di controlli automatici. McGraw-Hill, Milano. (In Italian).

Carlos A. Smith, Armando B. Corripio. Principles and Practices of Automatic Process Control. John Wiley and Sons.

#### Modalità verifica apprendimento

Closed-book, closed-notes, 2 hour written exam consisting of 1-2 sections assessing knowledge and understanding of the course topics and ability to apply them in a problem solving context. Each section will be independently graded. Threshold to pass is 18/30 an maximum mark is 30/30 cum laude. The final mark is obtained as the weighted mean of marks given to each section of the written exam. Example of a written exam:

[http://sisdin.unipv.it/labsisdin/teaching/courses/procon/files/Process\\_Control\\_Exam\\_Example.pdf](http://sisdin.unipv.it/labsisdin/teaching/courses/procon/files/Process_Control_Exam_Example.pdf)

#### Altre informazioni

#### Obiettivi Agenda 2030 per lo sviluppo sostenibile

[Gli obiettivi](#)